

WHAT IS CLAIMED IS:

1. A method for providing a bitwise constraint for test generation, the method comprising:

providing a language structure for expressing the bitwise constraint, said language structure including at least one constraint parameter and at least one operator, said constraint parameter being further constrained to an interval containing at least one value, said interval having interval limits;

propagating information bi-directionally to determine interval limits for said constraint parameters at least partially according to the bitwise constraint;

and computing one or more permissible values for the constraint parameter.

2. The method of claim 1, further comprising:

generating a single test value for the constraint parameter.

3. The method of claim 2, wherein said interval is representable as an arithmetic range and as a bitwise representation.

4. The method of claim 3, wherein providing said language structure further comprises providing a computational structure for representing said interval as said arithmetic range and as said bitwise representation in parallel, for propagating information to determine said interval limits.

5. The method of claim 4, wherein said language structure comprises a plurality of constraint parameters and wherein said computational structure is provided for reducing at least a portion of said plurality of constraint parameters

wherein the reducing comprises computing a new set of values for a first constraint parameter and propagating the new set of values to at least one other constraint parameter.

6. The method of claim 5, wherein said computational structure comprises a range list representation which includes an arithmetic range and a bitwise representation, wherein reducing at least a portion of said plurality of constraint parameters is performed by:

computing a first range in a first range list for at least a first constraint parameter;

computing one or more ranges in a second range list for at least a second constraint parameter; and

intersecting said first range list with said second range list to reduce said first and second constraint parameters.

7. The method of claim 6, wherein generating said test value is performed by:

determining a number of solutions for each interval;

selecting an interval randomly according to a weight to form a selected interval; and

selecting a point within said selected interval.

8. The method of claim 6, wherein said bitwise representation is provided by translating said intervals with a vector of a plurality of state values, each state value corresponding to one bit of said test value.

9. The method of claim 8, wherein said plurality of state values is four state values, each corresponding to a possible state of said bit, each state value being one of zero, one, zero or one, or a non-legal value.

10. The method of claim 3, wherein the bitwise constraint is derived from a constraint featuring an operator through propagation of bitwise information.

11. The method of claim 3, wherein said bi-directional propagation is at least partially performed by indicating bits having one or zero value according to a maximum of said interval.

12. The method of claim 11, wherein said bi-directional propagation is at least partially performed by correcting at least one interval limit.

13. The method of claim 12, wherein said bi-directional propagation is at least partially performed by removing an invalid interval.

14. The method of claim 13, wherein said test value for said constraint parameter is generated at least partially by selecting a particular interval.

15. The method of claim 14, wherein said particular interval is selected at least partially by weight of said interval.

16. The method of claim 15, wherein said test value is selected from said particular interval.

17. A method for providing a bitwise constraint for test generation, the method comprising:

providing a language structure for expressing the bitwise constraint, said language structure including one or more constraint parameters and at least one operator, said constraint parameter having a range list containing at least one value;

propagating information bi-directionally to determine limits for said constraint parameters; and

generating a test value for the bitwise constraint.

18. A method for providing a bitwise constraint and a range list constraint for test generation with an arithmetic range list, the arithmetic range list containing at least one arithmetic value, the method comprising:

providing a language structure for expressing the bitwise constraint with regard to the arithmetic list in parallel to the range list constraint, said language structure including one or more constraint parameters for the bitwise constraint and for the range list constraint and at least one operator;

propagating information bi-directionally to determine limits for said constraint parameters; and

generating a test value for the bitwise constraint.

19. A method for bitwise representation of a range list having an arithmetic constraint and a bitwise constraint, comprising:

translating the range list to a bitwise list; and

solving the arithmetic constraint together with the bitwise list constraint while using one or both of the range list and said bitwise list.

20. A method of test generation for a range list having an arithmetic constraint and a bitwise constraint, comprising:

providing a computational structure for containing the range list and a bitwise representation of the range list;

translating the range list to provide said bitwise representation of the range list; and

applying the bitwise constraint to said bitwise representation and the arithmetic constraint to the range list to perform the test generation.

21. The method of claim 20, further comprising:

performing a union of a plurality of range lists and of a plurality of said bitwise representations of a plurality of range lists to resolve the bitwise and arithmetic constraints.

22. A method for bitwise representation of a range list having an arithmetic constraint and a bitwise constraint, comprising:

- translating the range list to provide the bitwise representation of the range list;
- propagating the arithmetic constraint and the bitwise constraint to determine at least one new range according to both the arithmetic constraint and the bitwise constraint; and
- computing one or more permissible values for the constraint parameter.

23. The method of claim 22 further comprising generating a value according to said at least one new range.